

CLAIMS

WHAT IS CLAIMED IS:

1. A cooling water system having a condensing water loop, comprising:
a condenser system;
5 a cooling tower having water sides and a basin; and
a water treatment apparatus comprising:
a pump having:
an inlet port and an outlet port, said inlet port being connected to
an incoming water line for supply water to be treated,
10 drawn from the condensing water loop of the cooling water
system;
a first electrode ionization chamber comprising:
an inlet port and an outlet port, said pump outlet communicating
with said first electrode chamber inlet; and
15 two ion-producing electrodes spaced apart, wherein at least one of
said ion-producing electrodes comprises a titanium
electrode coated with ruthenium; and
a second electrode chamber comprising:
two ion-producing electrodes spaced apart; and
20 an inlet port and an outlet port;
wherein the electrode chambers communicate with the condensing water loop such that
water in the loop is circulated through the electrode chambers.
2. A system according to claim 2, wherein at least one of the two electrodes of the
second chamber comprises a solid copper bar.
- 25 3. A system according to Claim 1, wherein the water treatment apparatus further
comprises an automatic backwashing multimedia sediment filter, the filter having an
inlet port and an outlet port, said pump outlet port being connected to said filter inlet port
and said filter outlet port being connected to said first electrode ionization chamber inlet
port.
- 30 4. A system according to Claim 3, wherein said first chamber outlet is connected to
said second electrode chamber inlet port, wherein the outlet port of said second electrode

chamber is connected to the condensing water loop to enable water discharged from the apparatus to be dispersed uniformly and completely over the water side surfaces of the cooling tower.

5. A system according to Claim 1, further comprising a water pickup pipe located in the cooling tower basin and connected to the inlet port of the skid mounted pump.

6. A system according to Claim 3, with the cooling tower further comprising a spray dispersal system connected to at least one of the electrode chambers so that water which exits the water treatment apparatus can be dispersed uniformly and completely over the water side surfaces of the cooling tower.

7. A system according to claim 6, wherein the spray dispersal system is connected to the first electrode chamber.

8. A system according to claim 7, further comprising a make-up water source, the make-up source being connected to the second electrode chamber inlet.

9. A water system, comprising:
a water treatment apparatus comprising:
a first ionization chamber comprising:
two ion-producing electrodes spaced apart, at least one electrode comprising a titanium electrode coated with ruthenium; and
an inlet port and an outlet port, said inlet port being capable of being connected to an incoming water line for supplying make-up water to be treated by said chamber.

10. A system according to Claim 9, said water treatment apparatus further comprising:

a pump having an inlet port and an outlet port, said inlet port being connected to an incoming water line for supplying water to be treated by said apparatus from a condensing water loop of a cooling water system having a condenser and a cooling tower having a basin and water side surfaces;
an automatic backwashing multimedia filter having an inlet and an outlet port, wherein the pump outlet port is connected to the inlet port of the automatic backwashing multimedia filter;
a second ionization chamber comprising:

two ion-producing electrodes spaced apart, at least one electrode being
comprised of solid copper;
an inlet port and an outlet port, the outlet port of said filter being
connected to the inlet port of the second ionization chamber and
the outlet port of said ionization chamber being connected to a
condensing water loop for dispersal of the treated water
completely and uniformly over the water side surfaces of a cooling
tower.

11. A system according to Claim 9, the water treatment apparatus further including a
skid mounted pump and an automatic backwashing filter and an ozonator, wherein the
water from a condensing water loop is treated by passing it through the filter, the
ozonator and the ionization chamber.

12. A water treatment system according to Claim 11, further including a cooling
tower deck water dispersal system constructed and arranged to reintroduce the treated
water into the water loop by dispersing it down the sides of the cooling tower.

13. A method of treating and cooling water in a cooling water system having a
condensing water loop, comprising:

pumping water through a condensing water loop;
cooling the water;

drawing a portion of the water from the loop into a water treatment
apparatus, the water treatment apparatus comprising:

an inlet port and an outlet port, said inlet port being
connected to an incoming water line for supply water to be
treated, drawn from the condensing water loop of the
cooling water system;

a first electrode ionization chamber comprising an
inlet port and an outlet port, said inlet port communicating
with said first electrode chamber inlet, and two
ion-producing electrodes spaced apart, wherein at least one
of said ion-producing electrodes comprising a titanium
electrode coated with ruthenium; and

a second electrode chamber comprising two ion--
producing electrodes spaced apart, wherein at least one of
which comprises a solid copper bar and an inlet port and an
outlet port;

5 oxidizing the water by passing the portion of water through the first
electrode ionization chamber, wherein one electrode acts as an original anode and
the second electrode acts as an original cathode, the electrodes also being
positioned in the same chamber so that the water is passed over each of the
electrodes, either in sequence or substantially simultaneously;

10 ionizing the water by passing the water through the second electrode
ionization chamber wherein one electrode acts as an original anode and the
second electrode acts as an original cathode, the electrodes also being positioned
in the same chamber so that the water is passed over each of the electrodes, either
in sequence or substantially simultaneously; and

15 returning the water to the cooling loop.

14. The method of claim 13, further comprising the step of filtering the portion of
water through a multimedia filter constructed and arranged within the water treatment
apparatus prior to oxidizing the water.

15. The method of claim 14, further comprising the step of introducing make-up
20 water into the second ionization chamber for ionization and thereafter reintroducing the
water into the cooling tower.

16. A method of treating water, comprising the steps of:
supplying water; and
oxidizing the water utilizing a titanium electrode coated with ruthenium.

25 ionizing the water using copper electrodes, the ionization sanitizing the water and
providing residual copper ions which act as an algicide and a biocide;
providing the ionized oxidized drinking water which retains calcium in solution
to the animal for drinking.

17. The method of claim 16, further comprising the steps of:

30 ionizing the water using at least one copper electrode, the ionization sanitizing the
water and providing residual copper ions which act as an algicide and a biocide.

18. The method of claim 16, wherein the oxidizing step retains calcium in the water solution, the method further comprising the step of supplying water to a water feed line which is connected to a drinking device.
19. The method of claim 16 further including the steps of:
- 5 precipitating metals out of the water after oxidation, and
filtering out the precipitated metals from the water prior to ionization.
20. The method of claim 18 further including the step of dissolving calcium into solution from scale deposits.
21. The method of claim 18 further including the step of the poultry ingesting the
- 10 water retaining calcium in solution, which results in greater egg shell hardness.
22. The method of claim 17 wherein the at least one copper electrode also include zinc, which supply zinc ions to the water, which are then absorbed into the animal ingesting the water.
23. The method of claim 22 wherein the zinc ions absorbed into an animal and are
- 15 incorporated into the eggshell, where they act to kill bacteria.
24. The method of claim 20 further including the step of using the ionized oxidized water in a processing plant water system to prevent scale formation and dissolve existing scale, as well as kill algae, bacteria and fungus.
25. The method of claim 17 further including the step of using the ionized oxidized
- 20 water in a evaporative cooling water system to prevent scale formation and dissolve existing scale, as well as kill algae, bacteria and fungus.
26. An evaporative cooling system of the type blowing air over a wet surface, the improvement comprising:
- oxidation apparatus for oxidizing the water prior to supplying the water to the
- 25 evaporative cooling system, wherein the oxidation apparatus utilizes a titanium electrode coated with ruthenium, and
ionization apparatus for ionizing the water with copper ions prior to supplying the water to the evaporative cooling system.
27. The evaporative cooling system of claim 26 for use in connection with a
- 30 contained environment used to raise animals.
28. The evaporative cooling system of claim 27 for use in connection with pullet

houses.

29. The evaporative cooling system of claim 27 for use in connection with layer houses.